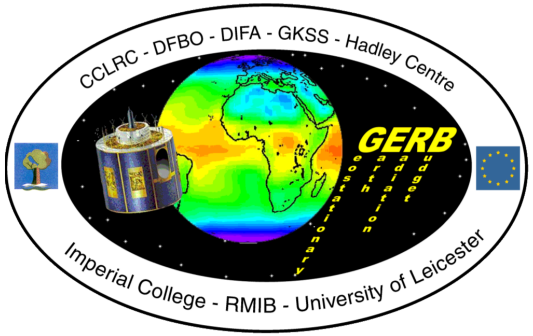

GERB HR Edition 1 dataset release

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2016 Radiation Budget Workshop, ECMWF Reading,
18–21 October 2016

Outline

1. Status of the GERB HR ED01 release

2. Description of GERB HR ED01

3. Flux comparisons CERES–GERB HR ED01

Status of the GERB HR ED01 release

- Hasn't been released yet (estimated release *end of November 2016*)
- The dataset is complete
- Known bad data has been removed from the dataset

What remains to be done

- User guide being updated (almost finished)
- Validation ongoing
- Release of the dataset on British Atmospheric Data Centre (BADC)
- Release of Quality Summary

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GERB L2 data formats

ARG Averaged Rectified Geolocated (256 × 256)

- Average of three GERB scans
- Timing varies across the columns of the images

HR High Resolution (1237 × 1237)

- SEVIRI imager data downscaled to 3 × 3 SEVIRI pixels, constrained to actual GERB radiance measurements
- Timing varies across the rows (!) of the images

BARG Binned Averaged Rectified Geolocated (247 × 247)

- Spatially averaged HR data (downscaled to 5 × 5 HR pixels)
- Temporally averaged over 15' time interval
- Auxiliary data (viewing geometry) defined at midpoint of the integration interval

GERB L2 data formats

ARG Averaged Rectified Geolocated (256 × 256)

Already released as ED01!

- Average of three GERB scans
- Timing varies across the columns of the images

HR High Resolution (1237 × 1237)

- SEVIRI imager data downscaled to 3 × 3 SEVIRI pixels, constrained to actual GERB radiance measurements
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Extent of the GERB HR ED01 dataset

GERB-2:

- Temporal extent: 28th March 2004 - 10th May 2007
- Spatial extent: Meteosat Field of View

GERB-1:

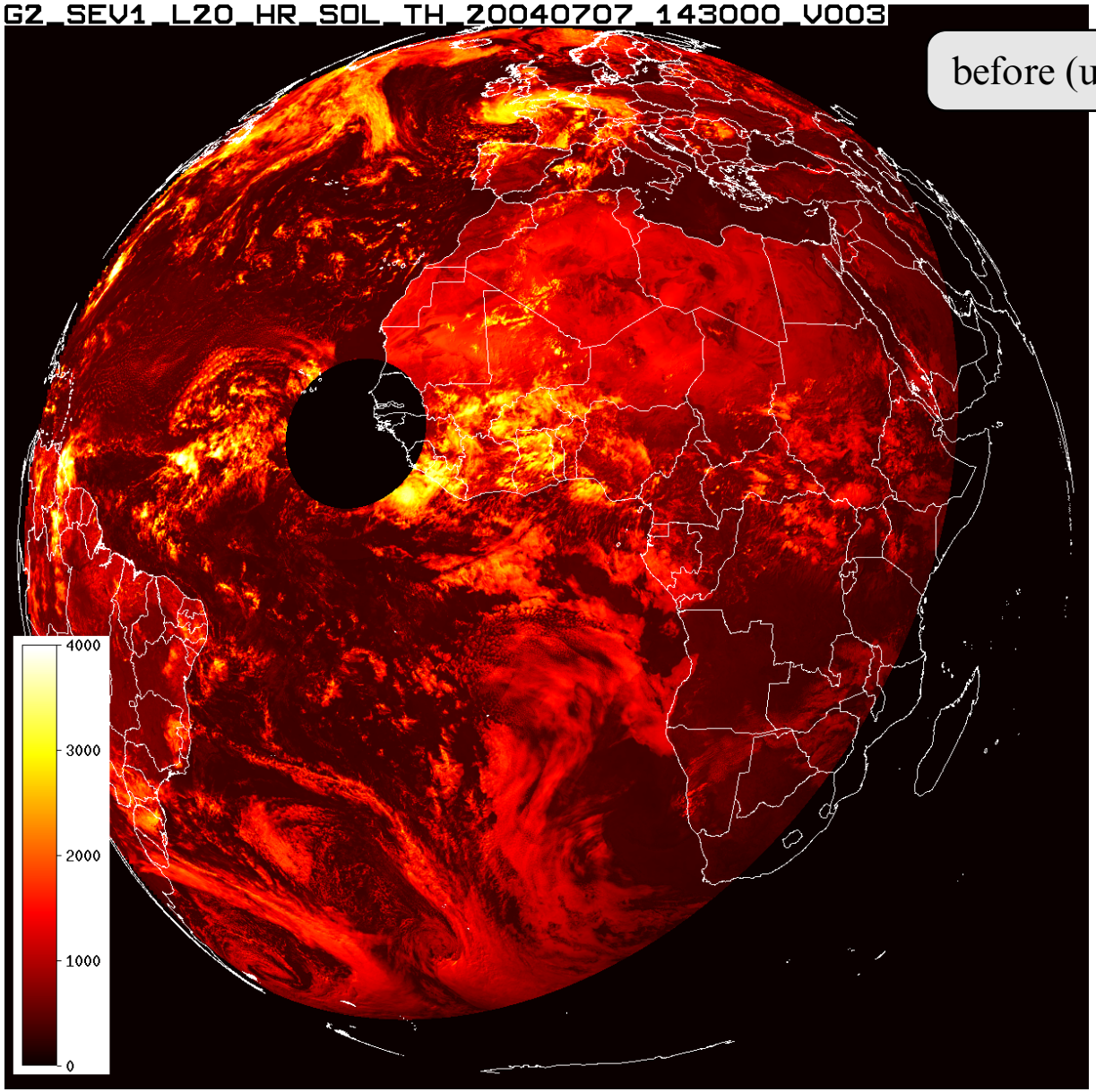
- Temporal extent: 10th May 2007 - 18th January 2013
- Spatial extent: Meteosat Field of View

Differences with the last reprocessing

GERB HR ED01 is an attempt to improve the solar flux for the purpose of monthly means. Simply masking the fluxes in the geometric sun glint area (sun glint angle $\leq 15°$) is not acceptable, since the missing fluxes may bias the monthly means.
Compared to the last (unreleased) reprocessing,

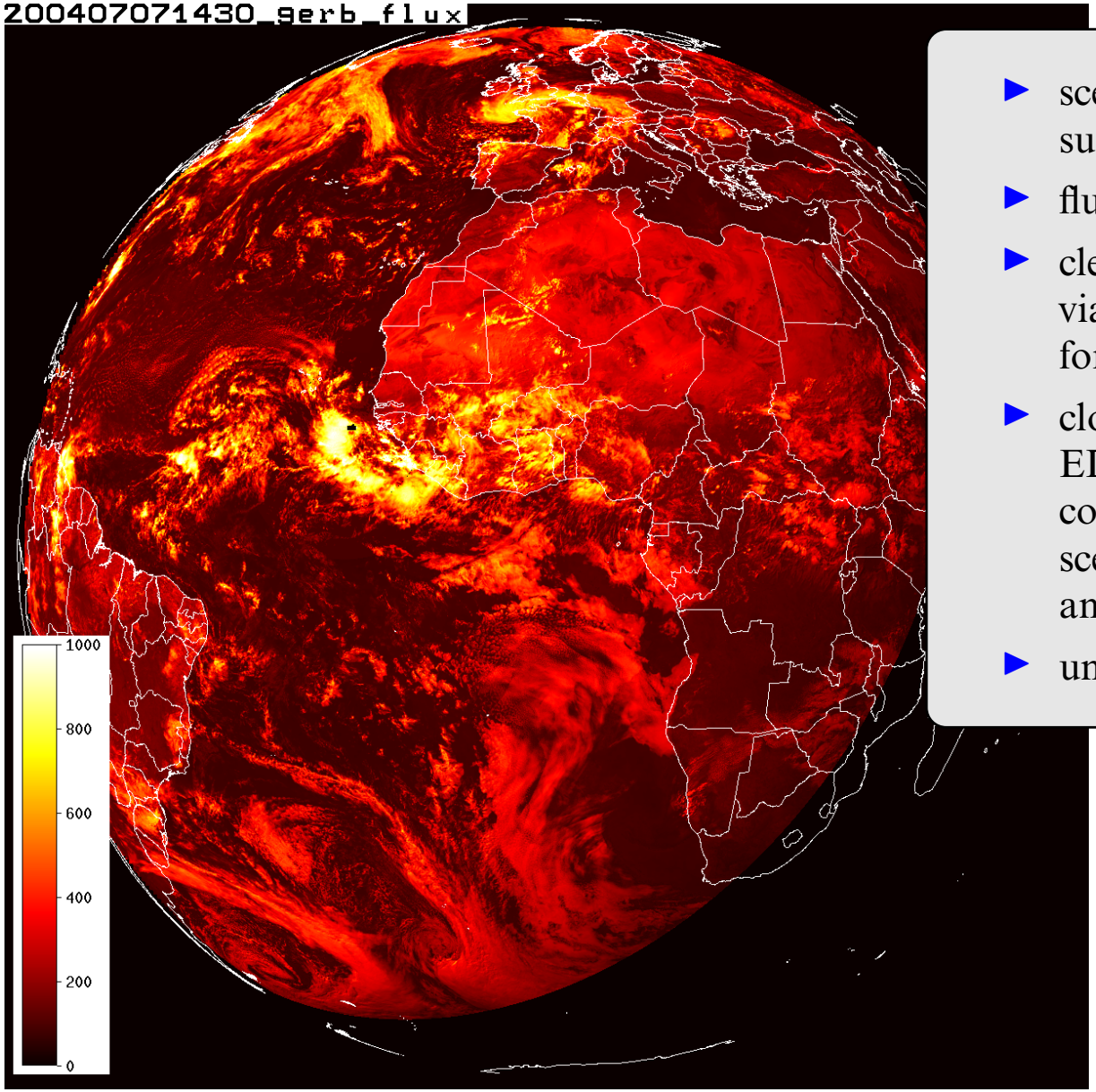
- The solar flux is estimated instead of masked in the geometric sun glint area
- The solar flux is estimated instead of masked in the twilight region
- There is a status flag that indicates the method a given flux was obtained with
- The validation is now done on the HR product directly

Example: 7 July 2004, 14:30



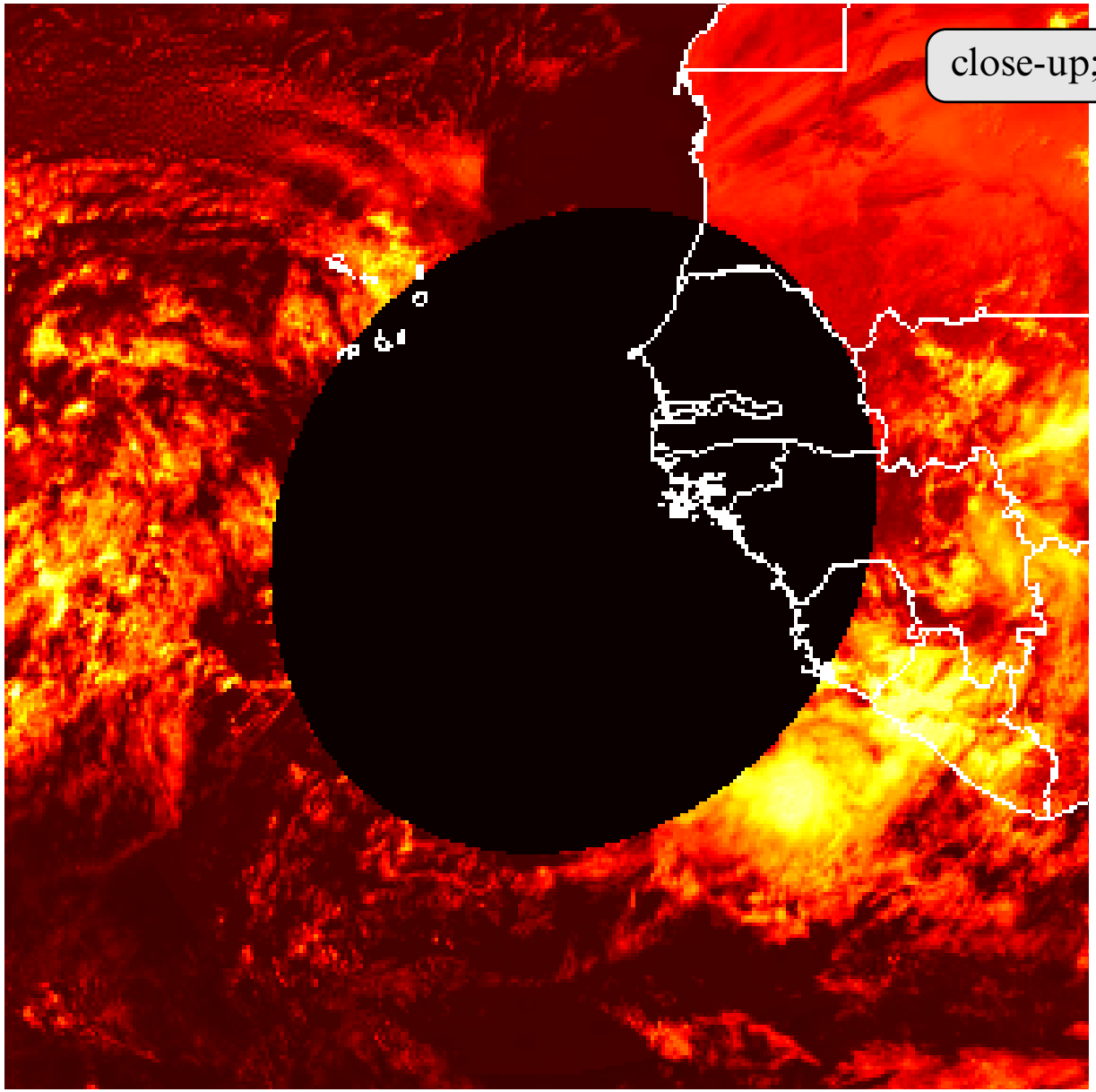
before (units = 0.25 W m^{-2})

Example: 7 July 2004, 14:30



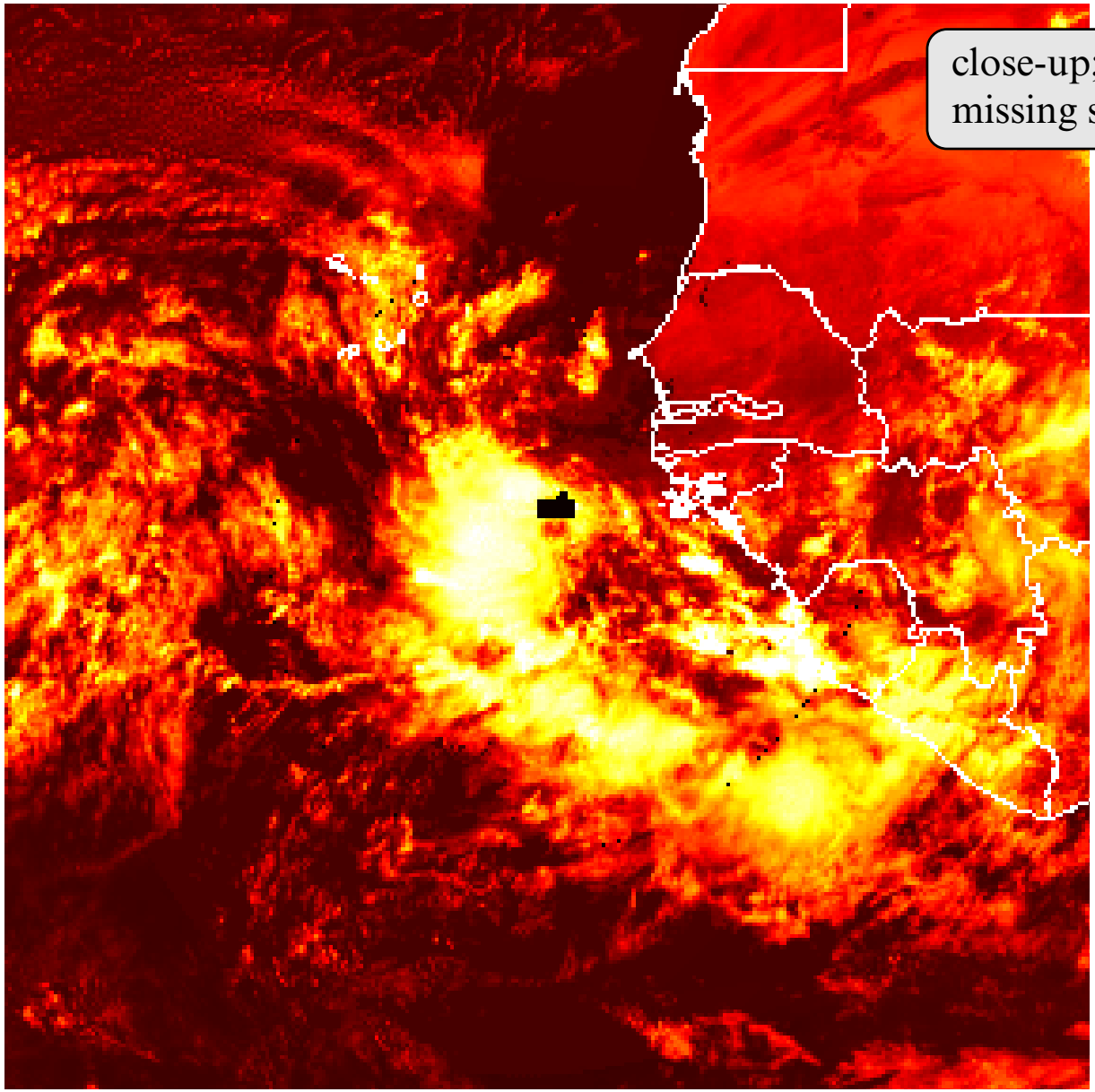
- scene ID extrapolated for sun glint angle $\leq 15°$
- flux over land restored
- clear-ocean flux calculated via monthly climatology for sun glint angle $\leq 25°$
- cloudy ocean pixels via ED01 radiance-to-flux conversion with altered scene ID for sun glint angle $\leq 15°$
- units = W m^{-2}

Example: 7 July 2004, 14:30



close-up; before

Example: 7 July 2004, 14:30

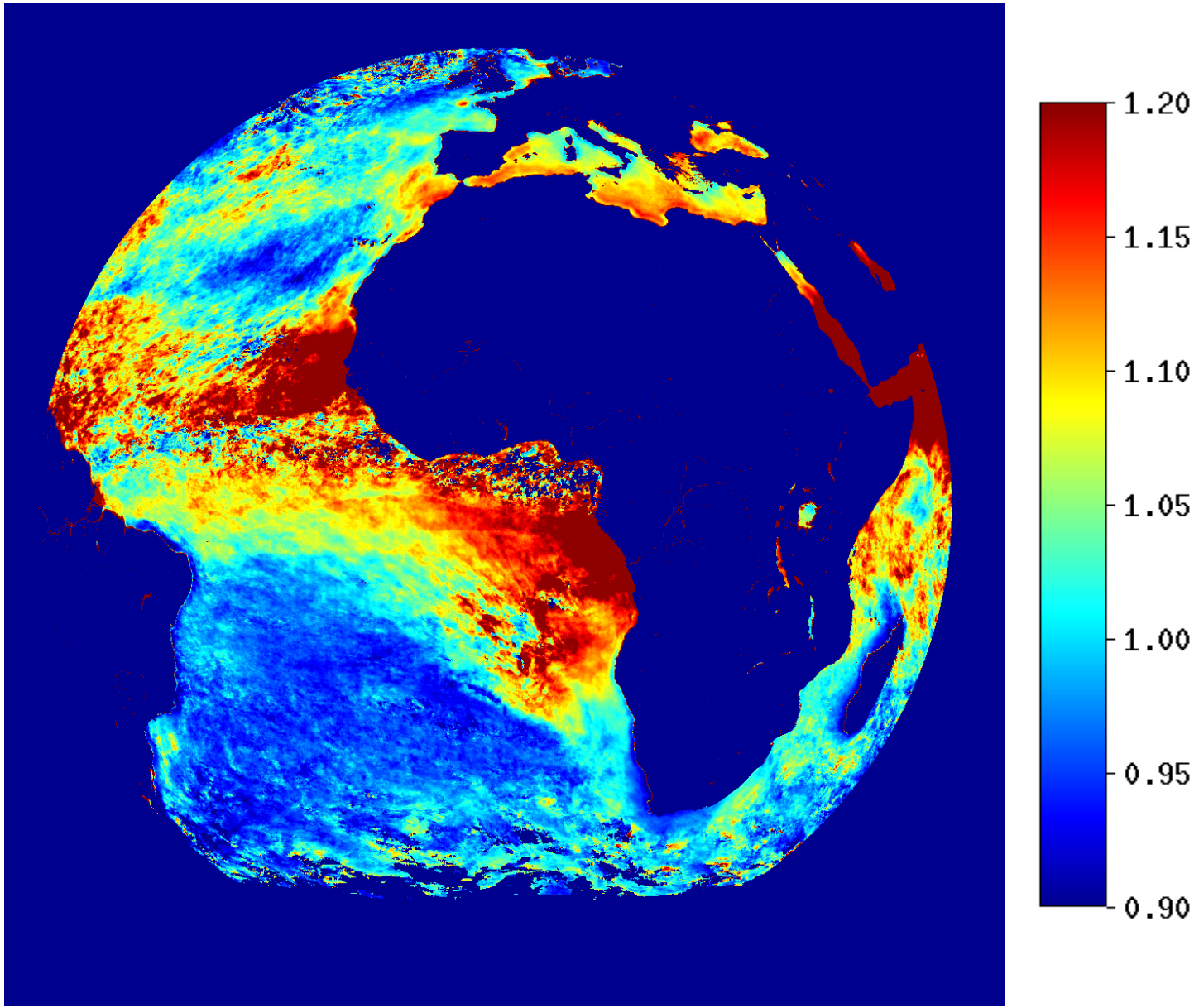


close-up; after (black spot due to missing scene ID)

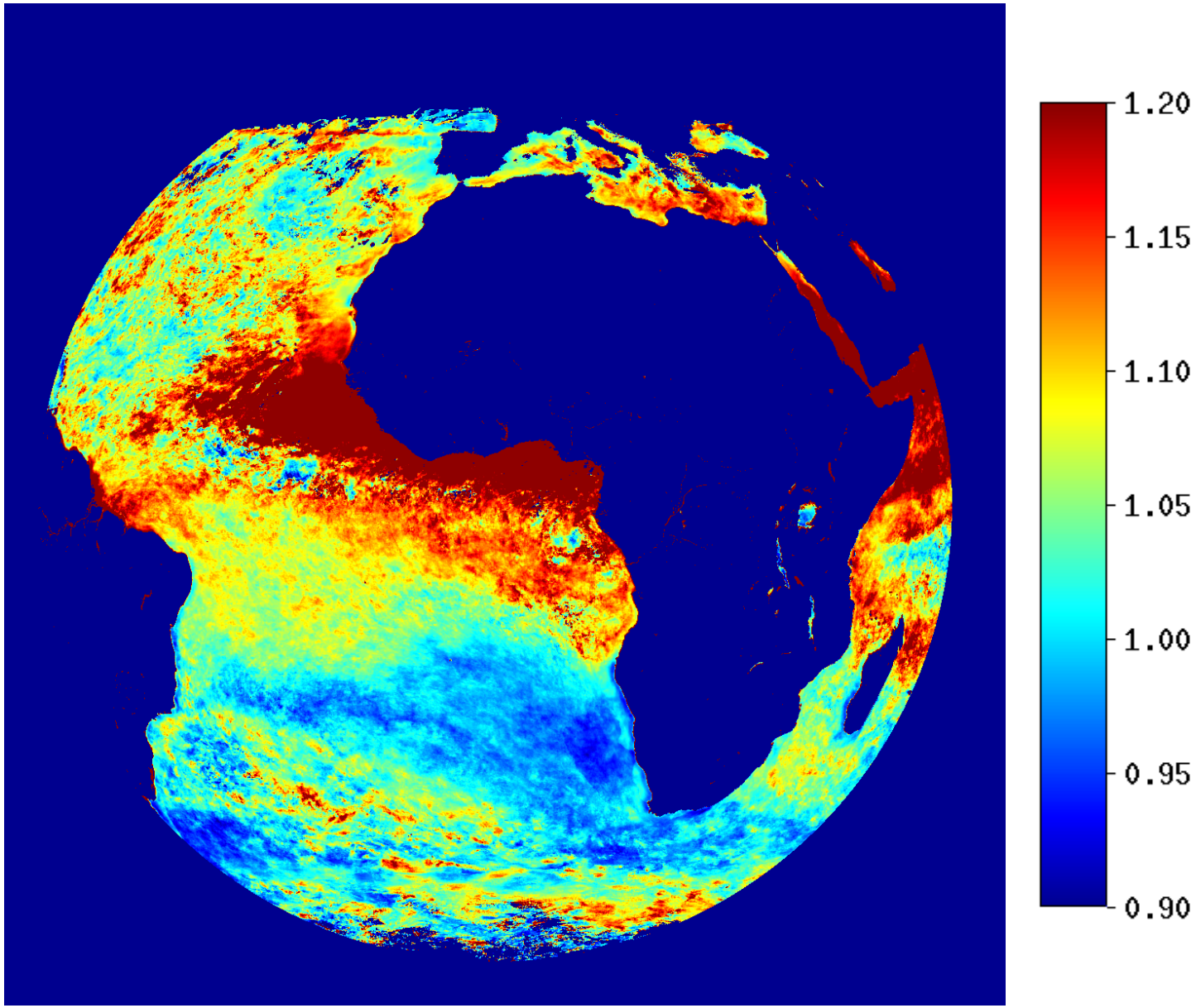
Technical aspects of the filling

- Computation of clear-ocean climatology
- Scene ID extrapolation
- Application of clear-ocean climatology
- Application of twilight model

Adjustment factor clear ocean June 2004



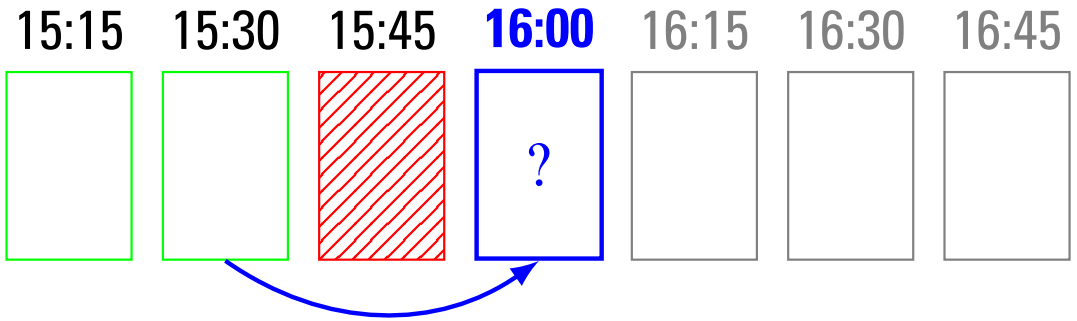
Adjustment factor clear ocean Dec. 2004



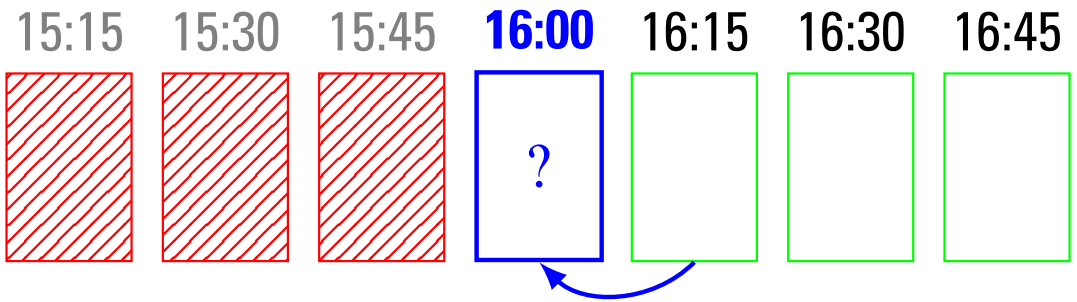
Scene ID extrapolation

- Sliding window centred on the current slot +/- 2.5 hours
- Forward and backward extrapolation in time

1. Backward scan (forward extrapolation in time)

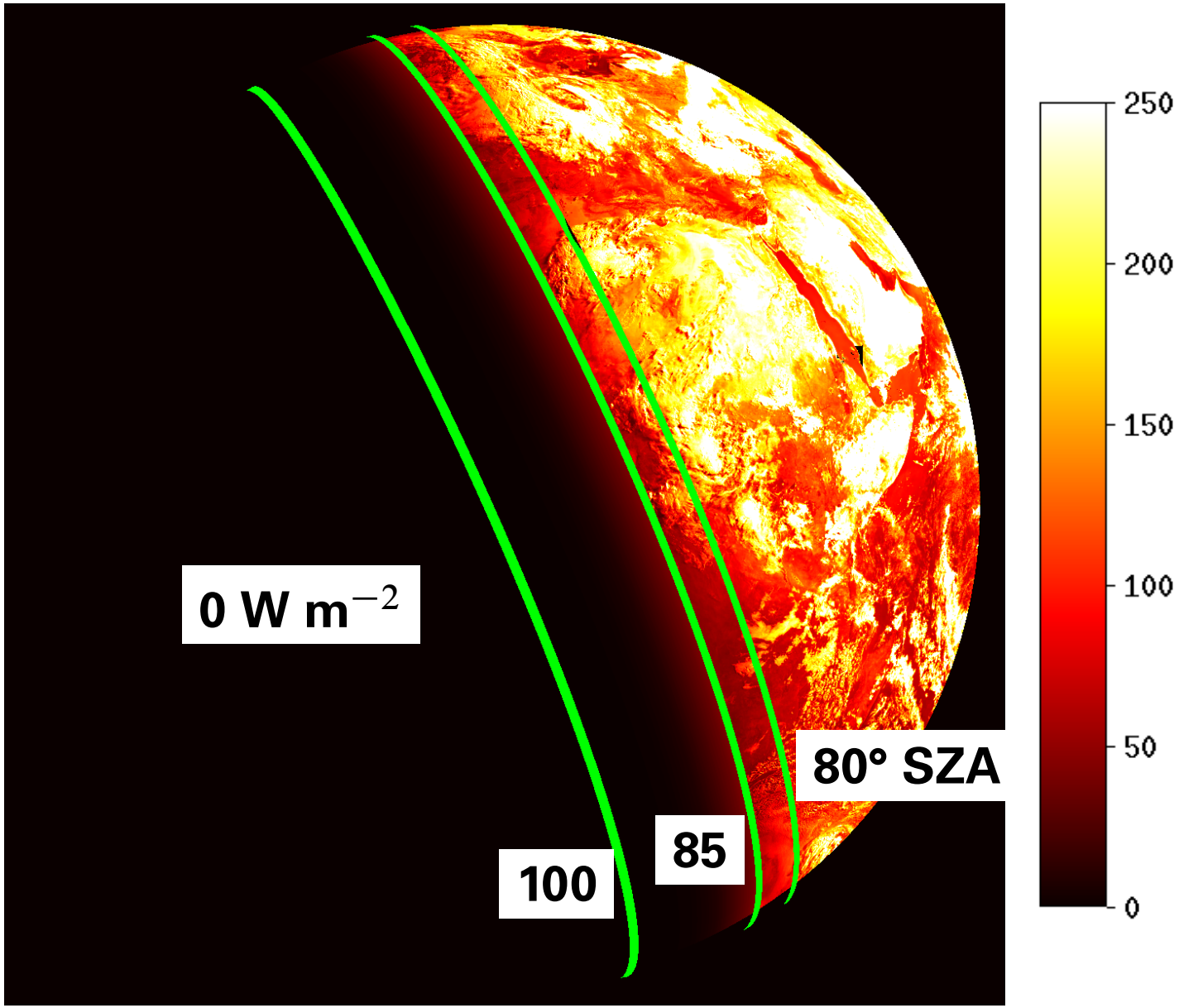


2. Forward scan (backward extrapolation in time)



- (Configurable) limit SZA < 80
- Backward extrapolation very useful for morning slots

Twilight region flux



Twilight region flux 80–85° SZA

- Between 80° SZA and 85, no flux was provided by GERB product
  - Solution: extrapolate scene ID and reperform radiance-to-flux conversion
- Some pixels before to 80° SZA are missing because clear-sky data are missing (up to 60 days prior to slot)
  - *Same solution*

Twilight region flux 85–100° SZA

SZA, °	flux, W m^{-2}
84.5	48.3428
85.5	39.7990
86.5	31.7399
87.5	24.9577
88.5	18.4358
89.5	12.4553
90.5	7.5284
91.5	5.0543
92.5	2.9716
93.5	1.5336
94.5	0.9251
95.5	0.6051
96.5	0.3768
97.6	0.3004
98.5	0.2401
99.5	0.1802

Outline

1. Status of the GERB HR ED01 release

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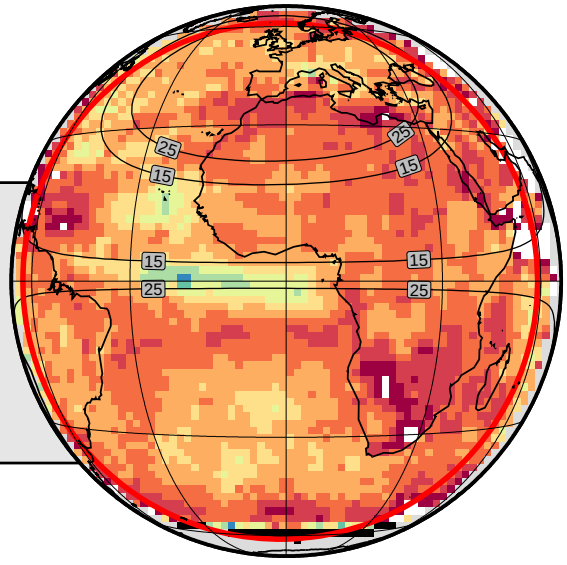
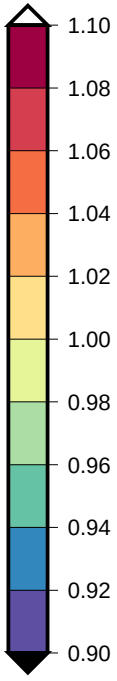
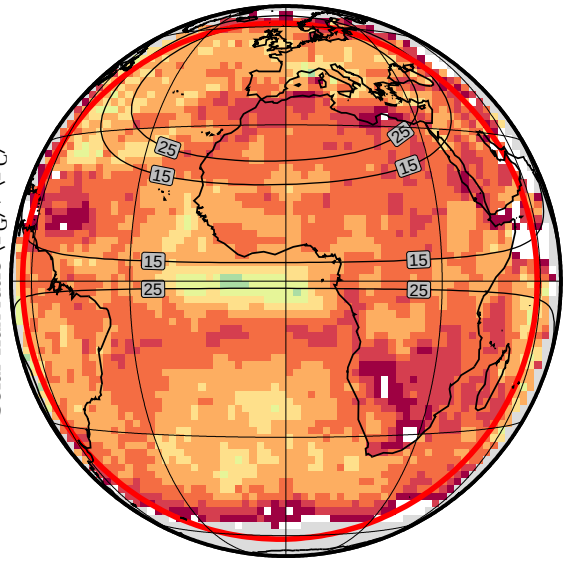
3. Flux comparisons CERES–GERB HR ED01

2004
all | “pure”
pixels
top: Jun
bot: Dec

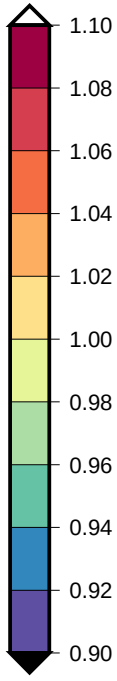


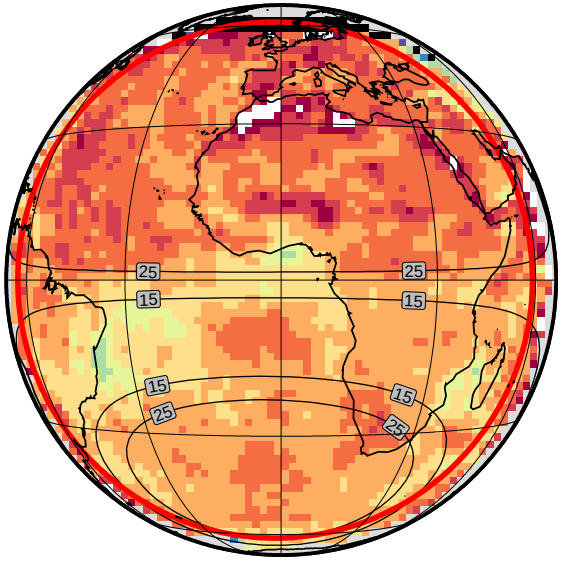
μ = 1.04 W m^{-2} σ = 0.07 W m^{-2}



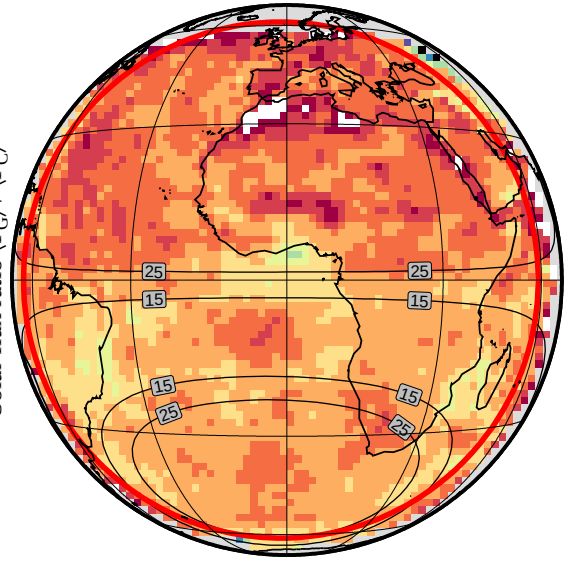


μ = 1.05 W m^{-2} σ = 0.04 W m^{-2}

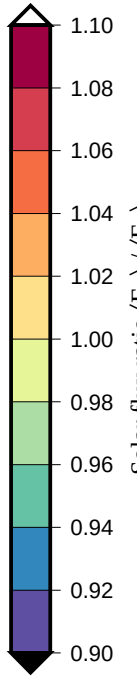




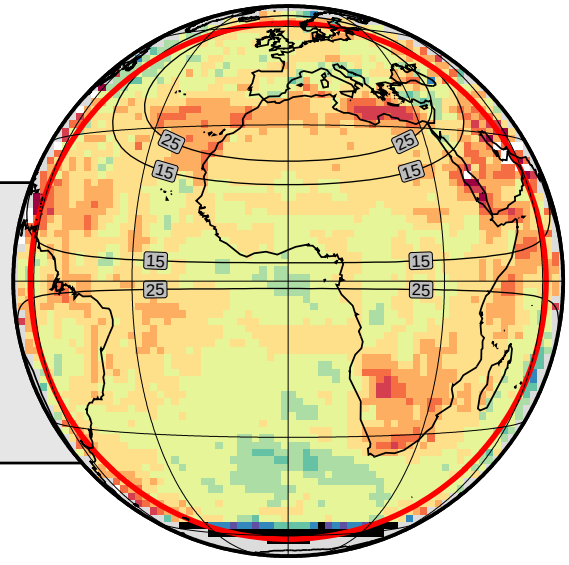
μ = 1.02 W m^{-2} σ = 0.09 W m^{-2}



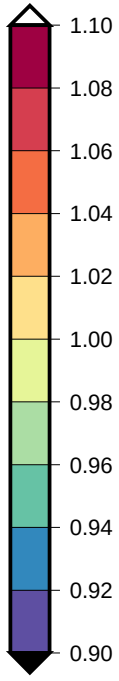
μ = 1.04 W m^{-2} σ = 0.03 W m^{-2}

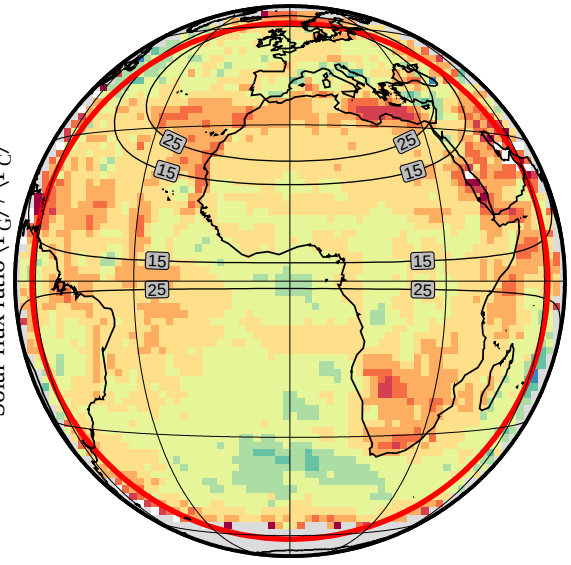


2007
all | “pure”
pixels
top: Jun
bot: Dec

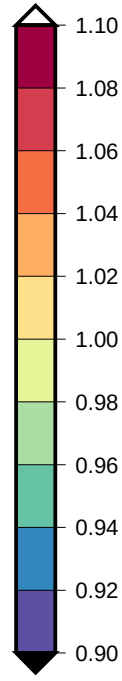


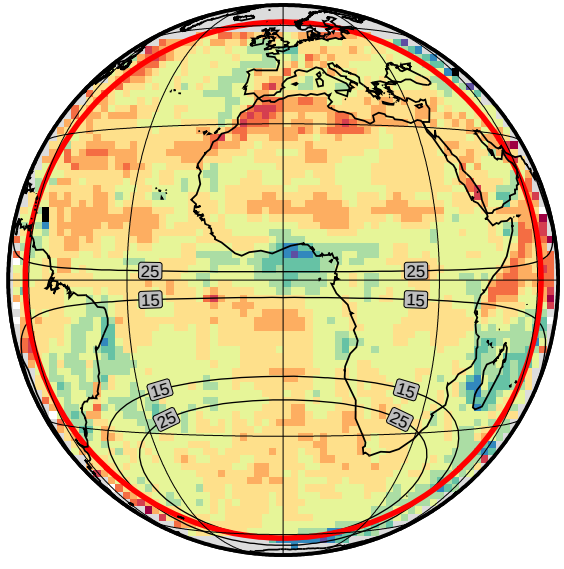
μ = 0.99 W m^{-2} σ = 0.07 W m^{-2}



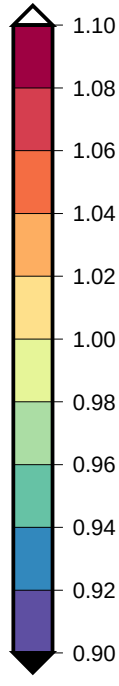


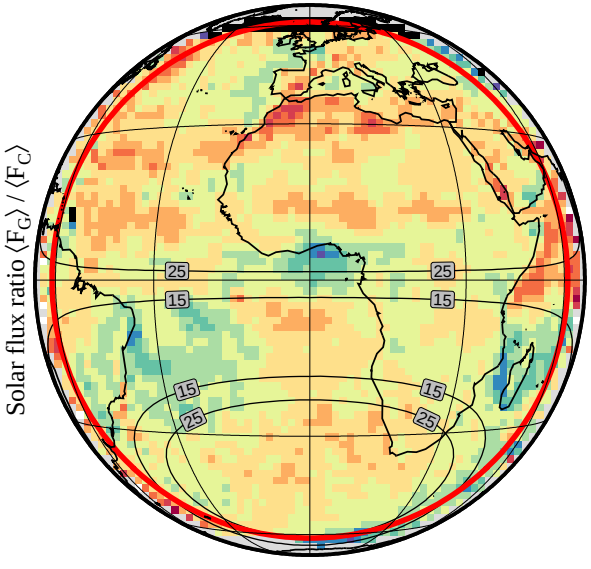
μ = 1.01 W m^{-2} σ = 0.04 W m^{-2}



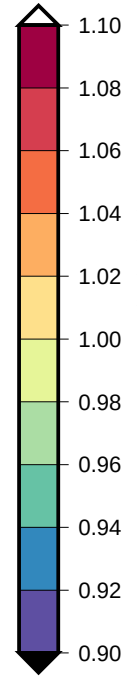


μ = 1.00 W m^{-2} σ = 0.04 W m^{-2}

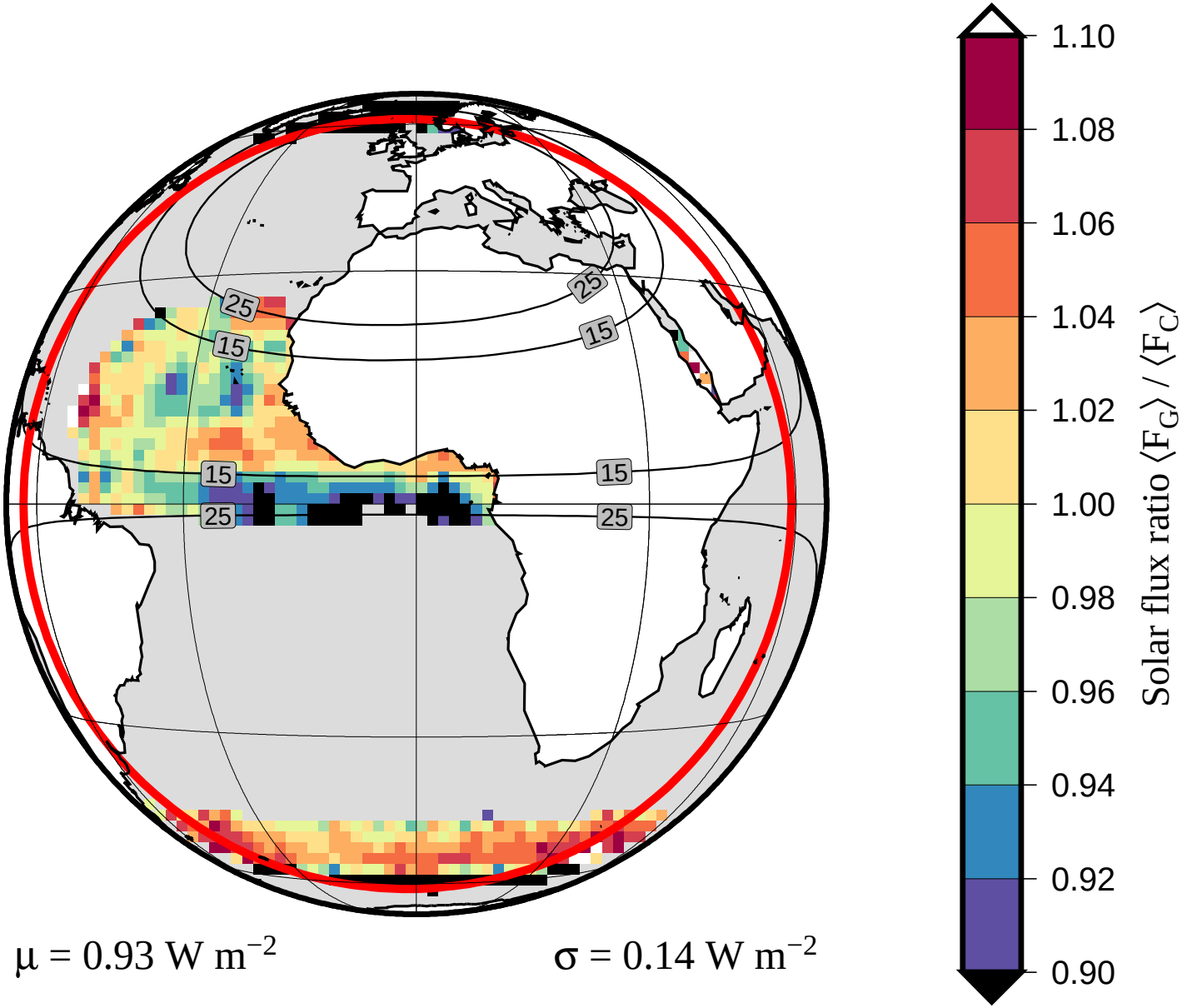




μ = 0.99 W m^{-2} σ = 0.08 W m^{-2}

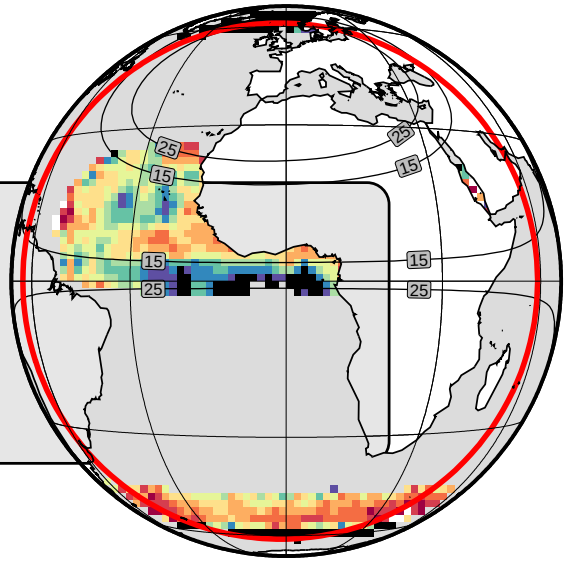


“Tainted” pixels for June 2004

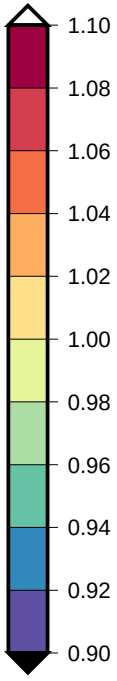


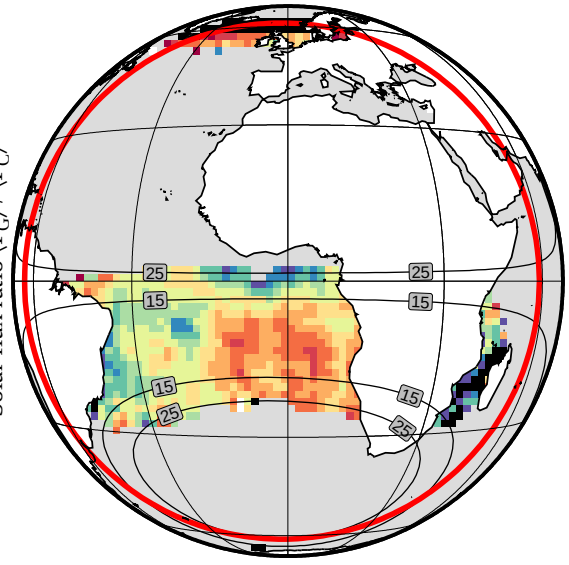
$\mu = 0.93$ W m^{-2} $\sigma = 0.14$ W m^{-2}

“tainted” pixels
Jun | Dec
top: 2004
bot: 2007

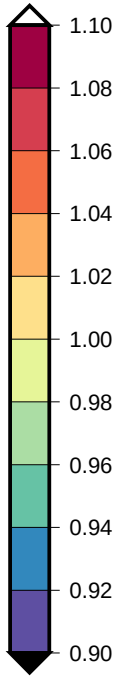


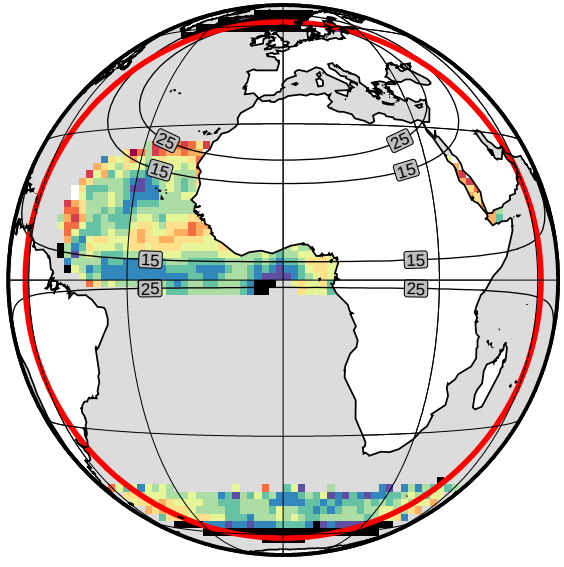
μ = 0.93 W m^{-2} σ = 0.14 W m^{-2}



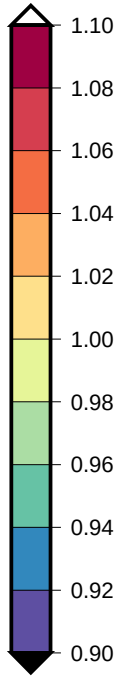


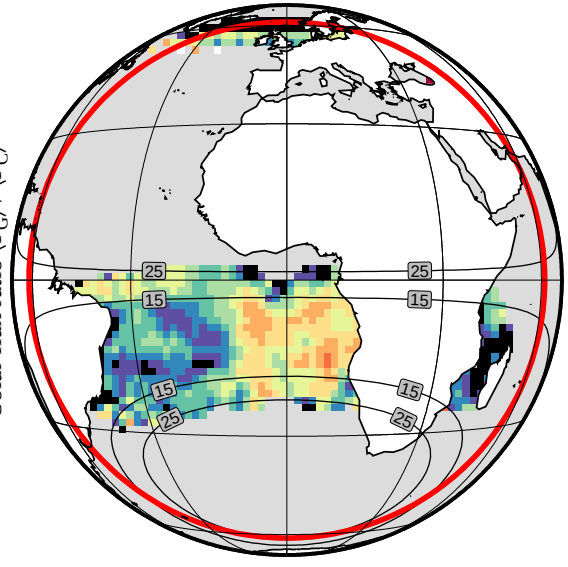
μ = 0.92 W m^{-2} σ = 0.17 W m^{-2}



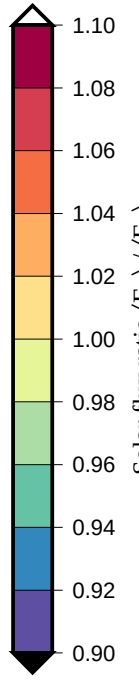


μ = 0.89 W m^{-2} σ = 0.14 W m^{-2}





μ = 0.89 W m^{-2} σ = 0.15 W m^{-2}



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- Dr. Jacqueline E. Russell, Imperial College
- Dr. Helen E. Brindley, Imperial College
- GERB team at RMIB
- RMIB